

# High Performance Flow Analysis and Control Tools for Aerial Vehicles, Phase II

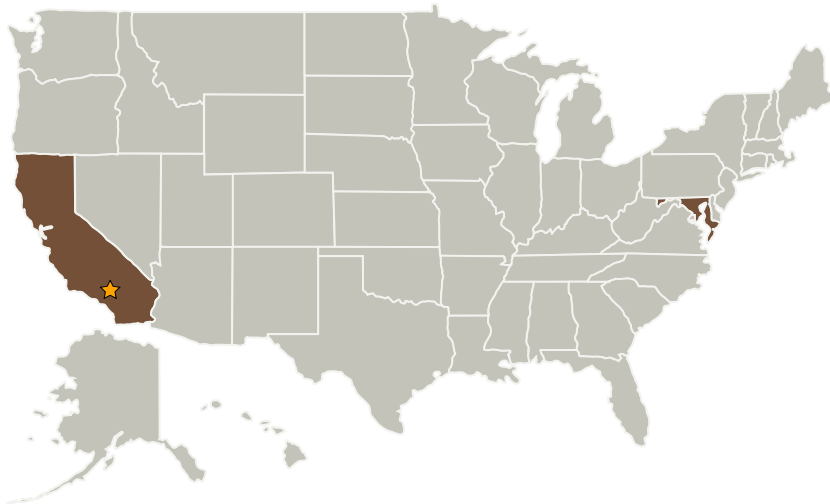
Completed Technology Project (2004 - 2006)



## Project Introduction

The objective of the project is to develop an open architecture, computer aided analysis and control design toolbox for distributed parameter systems, in particular, this effort aims at creating computational tools for emerging applications in aerodynamic analysis and control of high performance aerial vehicles. For small-unmanned aerial vehicles a well-designed network of micro actuators can enable aggressive performance not possible using traditional control surfaces such as ailerons, elevators, rudder and flaps. Even for larger aircraft the emerging paradigm of control involves an array of actuators and distributed sensing and actuation. In addition to enhanced performance these control architectures can provide greater redundancy to confront actuator failures. In Phase I, various aspects of the model definition, control parameterization, model reduction, control design and simulation for verification were illustrated for a benchmark problem. In addition, a computational architecture leveraging commonly available tools to the scientists/engineers was defined. The proposed toolbox in conjunction with commonly used general purpose software will provide designers the ability to seamlessly test control design for aerodynamic applications by integrating and automating several key steps in design cycle. These tools will find commercial applications not only in the emerging unmanned aerial vehicle industry but other land, sea and air vehicles as well.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Armstrong Flight Research Center (AFRC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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| Organizations Performing Work           | Role                    | Type        | Location             |
|---|-------------------------|-------------|----------------------|
| ★Armstrong Flight Research Center(AFRC) | Lead Organization       | NASA Center | Edwards, California  |
| Techno-Sciences, Inc.                   | Supporting Organization | Industry    | Beltsville, Maryland |

| Primary U.S. Work Locations |          |
|-----------------------------|----------|
| California                  | Maryland |

### Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

### Technology Areas

**Primary:**

- TX15 Flight Vehicle Systems
  - └ TX15.1 Aerosciences
    - └ TX15.1.3 Aeroelasticity